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CONSERVATION STRATEGY FOR POA LAXIFLORA

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for

Poa laxiflora

Siuslaw National Forest
Oregon

April, 1993

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Poa laxiflora

Siuslaw National Forest, Oregon

April 1993

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I. INTRODUCTION

Poa laxiflora, loose-flowered bluegrass, is a Forest Service Region 6 Sensitive Species which occurs in forests in the Oregon Coast Range Mountains. The Siuslaw National Forest contains significant habitat for this species, and much of this habitat is being altered by timber harvesting and other Forest management activities.

Consulting with Federal, State and Private Botanists, the Regional Forester identifies sensitive species that are in need of special management consideration. Chapter 2670 of the Forest Service Manual (1990) directs National Forests to prepare Conservation Strategies for sensitive species adversely affected by standard management practices. These documents prescribe management direction, monitoring, and protection for a species based on the species needs over its entire range rather than on a local population or individual site. Of the 33 plants currently on the Siuslaw National Forest Sensitive Plant List, Poa laxiflora is the species most often affected by Forest management activities. Therefore, a conservation strategy is especially needed for this species to ensure its survival and prevent its placement on the Federal list of endangered and threatened plants. This management strategy ensures short-term protection and sets the stage for a long-term strategy based on information gained from monitoring. This is a dynamic process; the Conservation Strategy will be adjusted and revised as we learn more about Poa laxiflora through monitoring and studying its habitat.

In addition, Forest Service policy requires that Forest Service land be managed to maintain viable populations of all native plants and animals. A viable population consists of the number of individuals necessary to perpetuate a species in natural, genetically stable, self-sustaining populations.

II. SPECIES INFORMATION

A. Plant Description

Poa laxiflora, in the Gramineae (often called Poaceae) Family, is a native, perennial, rhizomatous grass (Fig. 1). This delicate, inconspicuous grass grows about 9-12 dm tall (3-4 ft.), and has slender, lax stems that are easily bent. The loose, open inflorescence is a panicle, and bears spikelets mostly near the tips of the branches. The stems have a distinctive "feel" to them, with retrorse (downward pointing) scabrous hairs. Leaf blades are flat, scabrous (rough to the touch), and 3-5 mm wide with typical Poa canoe-shaped tips. The membranous, obtuse to rounded ligules are about 1 mm long on the basal leaves and up to 3 mm long on the uppermost stem leaves. A technical description can be found in Hitchcock et al. (1969).

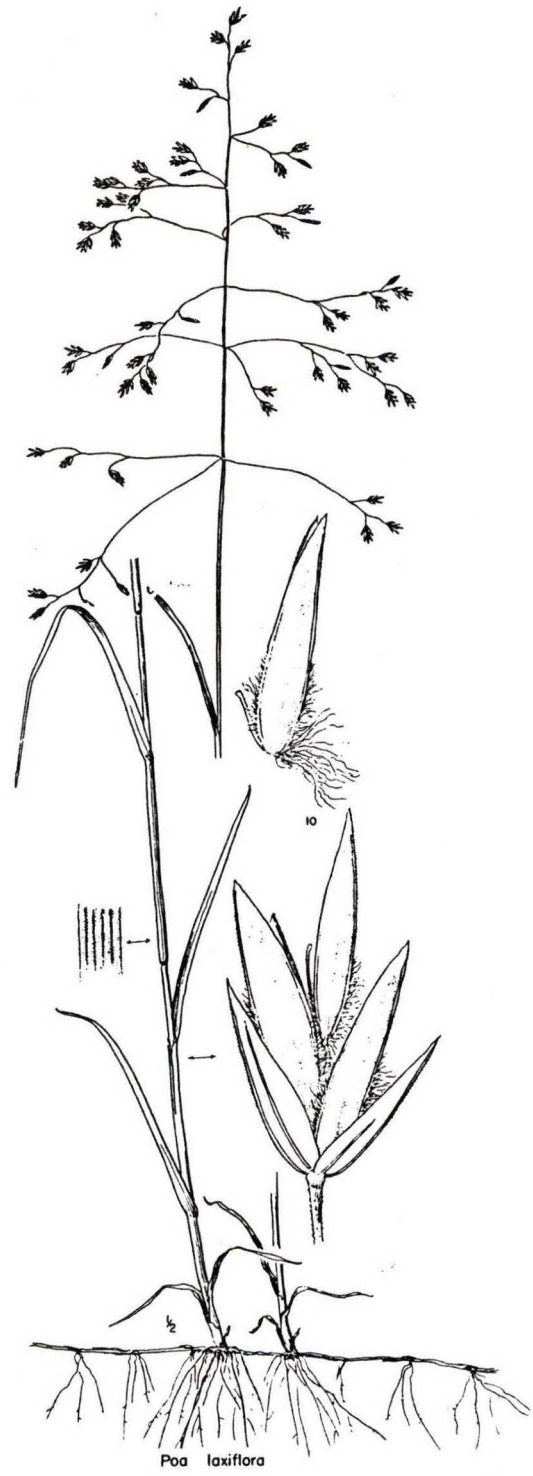

Fig. 1. Line drawing of Poa laxiflora. Reprinted from Vascular Plants of the Pacific Northwest by Hitchcock et al. (1969) with permission from the University of Washington Press, Seattle, Washington.

B. Status

Poa laxiflora is currently on the R6 Sensitive Species List for both Oregon and Washington. The U.S. Fish & Wildlife Service (USFWS) lists Poa laxiflora as a 3C species (those taxa that are more abundant and widespread than was originally thought and/or those not subject to any identifiable threat). Poa laxiflora is not currently listed by Oregon Department of Agriculture because there are a relatively high number of sites for this species compared to other priority species that require their efforts. Poa laxiflora is a List 2 species with the Oregon Natural Heritage Program (ONHP). Their List 2 species are defined as taxa endangered or threatened in Oregon, or possibly extirpated from Oregon, but more common or stable elsewhere. However, Poa laxiflora is not more common or stable in other states, but ONHP decided to list it as such because it did not fit on other Lists and represents a compromise which aids BLM in managing this species.

C. Similar Species

Poa laxiflora often grows adjacent to Poa trivialis (rough bluegrass), and the two species are easily confused. Though they can be differentiated by several characteristics, they are best distinguished by the inflorescence: Poa laxiflora has spikelets born only near the tips of the branches, while Poa trivialis has a more dense inflorescence, in which the spikelets occur throughout the inflorescence. Other similar species that may grow with Poa laxiflora are Poa marcida (weak bluegrass) and Glyceria striata (mannagrass). Grenier (1991) details ways to differentiate Poa laxiflora from Poa marcida, P. trivialis, and Glyceria striata.

D. Range and Distribution

Poa laxiflora ranges from southeast Alaska southward along the Olympic Peninsula of Washington into northwestern Oregon. In Oregon, current sites occur as far south as Douglas County. The Oregon Coast Range represents the center of distribution for Poa laxiflora and contains the majority of known sites. The Siuslaw National Forest alone has 213 positive sites. Poa laxiflora also occurs on BLM and private lands within the Oregon Coast Range.

Five Poa laxiflora sites have been reported from the Oregon Cascade Mountains on the Mt. Hood National Forest. In Washington, the Washington Natural Heritage Program reports seven populations (Gamon 1991). Of these, one population occurs on Federal land, in Olympic National Park; its status is unknown because it has not been relocated since 1937. The other six populations are all on private land in southwest Washington in Pacific County, along the mouth of the Columbia River.

It is not known how many populations occur in British Columbia. In 1988, there were 10 known populations. There are 12 specimens of Poa laxiflora on file at the British Columbia Conservation Data Center, all collected in the early 1960's on the Queen Charlotte Islands (Douglas 1991). The sensitive plant listing process in British Columbia ranks

600+ species, with Poa laxiflora having a low sensitivity status. Douglas (1991) thinks Poa laxiflora may be more abundant in British Columbia and that the few collections of this species is a reflection of low number of collectors due to the remote, rugged conditions of the coastal areas.

Alaska has one sighting, near the southeastern tip of the state by Cape Fox Springs. The southeastern portion of the state may have habitat suitable to support Poa laxiflora, but the area has not been extensively surveyed due to its remote location.

E. Habitat

1. Physical Characteristics.

Poa laxiflora grows in moist, forested areas that receive a high amount of rainfall. Field observations suggest that sites are located in areas where the water table is close to the soil surface, and/or evaporation is low. It typically occurs on flat terrain or gentle slopes, in draws and broad depressions, along streams and floodplains, and at the toe of slopes. On the Forest, average slope is about 10%, though slopes range from 0-80%. Sites have been found at elevations ranging from near sea level (50 ft.) to 3,780 ft., averaging 1,000 ft.

In the south portion of the Forest, on Mapleton District, all Poa laxiflora sites, except for one, are in riparian areas, whereas on the northern part of the Forest, on Hebo District, Poa laxiflora can be found in a variety of topographic situations, ranging from riparian to ridgetops. This might be explained by soils. In general, Mapleton District has shallow to moderately deep soils over hard impermeable bedrock. Therefore, water drains off faster, and many areas (upslope of riparian) will become dry early in the year. Poa laxiflora is a shallow rooted species and only roots in the upper litter layers. Therefore, it would be limited to riparian areas in these shallow soil situations. In contrast, Hebo District generally has deep soils over fractured bedrock, and water is retained for a longer period of time. Hebo District has a more perennial ground water system than Mapleton.

2. Biological Characteristics.

a. Plant Associations. Plant association data has not been consistently collected by field botanists conducting sensitive plant surveys on the Forest. However, Poa laxiflora has been recorded as occurring in the following plant associations: western hemlock/sword-fern, western hemlock/vine maple/sword-fern, western hemlock/salmonberry, western hemlock/vine maple/salmonberry, western hemlock/devil's club and western hemlock/Oregon oxalis.

b. Typical Habitats. Poa laxiflora typically occurs in alder (Alnus rubra) flats and alder/conifer mixed stands with scattered swordfern and an abundance of forbs, sedges and grasses. It is found in moist areas near or in riparian zones, seeps, springs, bogs, and other areas which have a high water table (see Physical Characteristics section), and prefers partial shade, with canopy cover averaging 50-60%. In

coniferous stands with high canopy cover (e.g. 90%), populations are small and scarce. However, large vigorous populations have been found in pure decidous stands that have high canopy cover. This may be attributed to much higher light levels in the spring before the tree leaves are fully developed. Poa laxiflora is often in association with salmonberry (Rubus spectabilis), occurring in openings where the brush is not dense and continuous. It is rare to find Poa laxiflora populations under dense brush. Optimum habitat consists of moist, grassy openings with minimal shrub cover.

Poa laxiflora often occurs in areas with small-scale disturbances in which the canopy cover has not been drastically altered. These disturbances can be natural or man-made, and include: old cat roads (10-15 years old), landings (2-10 years old), commercially thinned areas (10-15 years old), flood plains that regularly receive scouring, old slumps, and in well-shaded ditches and cutbanks of active roads. It is commonly found along big game trails, and on mountain beaver mounds.

c. Associated Species. The tree species most commonly associated with Poa laxiflora are: Alnus rubra (red alder), Acer circinatum (vine maple), Acer macrophyllum (big-leaf maple), and Pseudotsuga menziesii (Douglas-fir). The shrub species most commonly associated Poa laxiflora are: Rubus spectabilis (salmonberry) and Sambucus racemosa (red elderberry). Poa laxiflora has been found with a variety of forbs and grasses, however, it is most frequently associated with: Athyrium felix-femina (lady fern), Bromus vulgaris (Columbia brome), Carex deweyana (Dewey's sedge), Festuca subulata (bearded fescue), Festuca subuliflora (crinkle awn fescue), Galium triflorum (bedstraw), Luzula parviflora (small-flowered woodrush), Melica subulata (Alaska oniongrass), Montia sibirica (candyflower), Oxalis oregana (Oregon oxalis), Poa trivialis (roughstalk bluegrass), Polystichum munitum (swordfern), and Stachys mexicana (great betony). Appendix 1 provides a detailed list of associated species and Appendix 2 provides information on frequency of association.

Poa laxiflora is least likely to occur in dry habitats with heavy brush cover, such as those plant communities which are dominated by Gaultheria shallon (salal), Vaccinium ovatum (evergreen huckleberry), and Vaccinium parvifolium (red huckleberry). These plants can withstand lower moisture levels than Poa laxiflora apparently can tolerate. In addition, they tend to make thick stands over considerable areas where Poa laxiflora cannot compete. If salal is present in Poa laxiflora habitat, it will be a minor component, primarily confined to rotting logs. Other species often found in salal-dominated communities (indicating unlikely habitat for Poa laxiflora) are Holodiscus discolor (ocean spray), Rosa gymnocarpa (rose), Corylus cornuta (hazelnut) and Berberis nervosa (Oregon grape).

d. Microsites. Poa laxiflora often occurs as small groups of plants, occupying microsite openings between the dense brush. Since 1990, Forest Service Sensitive Plant Sighting Forms provide opportunities to describe the microsite characteristics of each subpopulation. Therefore, our knowledge is increasing about microsite characteristics affecting the occurrence of this species.

Poa laxiflora is often closely associated with other native graminoids: Bromus vulgaris, Carex deweyana, Festuca subuliflora, and Melica subulata.

e. Limiting Factors. Moisture is thought to be the most important limiting factor influencing the ability of Poa laxiflora to persist in an area. Poa laxiflora is found in sites with distinctly more soil moisture than the forest in general, but not where the soil is waterlogged late into the growing season. Poa laxiflora has been observed in open sunny areas (even surviving several clearcuts) in which the aspect, slope, location, and associated species suggested that moisture was retained during the growing season.

Light is also thought to be a limiting factor because Poa laxiflora is not usually able to persist under dense brush or too high canopy cover. Field observations suggest that Poa laxiflora thrives in 50-60 percent canopy cover. When canopy cover is 90 percent or greater, Poa laxiflora populations are small and sparse. At one monitoring site on Hebo District, the Douglas-fir canopy cover was thinned from greater than 90% to approximately 70%, resulting in an increase of the Poa laxiflora population from less than 100 flowering culms to several hundred. Light may not be as limiting a factor as moisture because Poa laxiflora is able to grow in some areas with little or no canopy cover if moisture is retained through the growing season. This may indicate that shade is not an essential survival component when adequate moisture can be supplied.

F. Population biology

Little is known about the population biology of Poa laxiflora, including pollination mechanisms and seed production, viability and dispersal. In general, grasses are wind-pollinated. However, Poa laxiflora occurs in wet, often sheltered areas, and, therefore, wind-pollination may not be the primary mode of reproduction.

Often management uses numbers as a criteria for making decisions. Unfortunately, due to its rhizomatous habit and a lack of knowledge about is reproductive biology, we are unable to define what constitutes a population of Poa laxiflora. Until specific research is undertaken, we will not be able to determine if seed production is important to Poa laxiflora's survival, how far seeds are dispersed, how far pollen travels, or what is the genetic variability of small local groups of plants or the species as a whole.

Because of its rhizomatous habit and difficulty in differentiating vegetative portions of the plant from other grasses in the dense herbaceous layer in which it occurs, the most effective method of quantifying populations has been to count the number of flowering culms. Therefore, Poa laxiflora size estimates actually represent the number of flowering culms.

The majority of Poa laxiflora sites occur as small, scattered groups of plants which may be considered subpopulations of one large population,

depending on proximity to each other which affects the opportunities for genetic exchange. Approximately 60% of known Poa laxiflora populations have less than 30 flowering culms, while 77% have less than 60 flowering culms. Only 17% had 100 or greater flowering culms.

The main inconsistency regarding our lack of knowledge in what consitutes a population is how the field surveyor interprets what small groups to count as one population. In early surveys (e.g., 1986-1989), it was common practice to count each small clump of flowering culms as one population. More recent surveys (1990-1991), using an updated Forest Service Region 6 sighting forms, counted each small clump of flowering culms as a subpopulation of a larger population. The general guidelines for determining the boundaries of the larger population have been to group subpopulations of Poa laxiflora that occur close together in continuous habitat.

In 1988, a study of the modes of reproduction was conducted on the Alsea District of the Forest. Flowering culms were bagged at anthesis to determine seed viability and if Poa laxiflora reproduced by self-pollination, cross-pollination, or both. Results were statistically inconclusive, however, it was established that seeds from outcrossing as well as selfing were viable. It is not known if Poa laxiflora flowers every year. Some data from Alsea & Hebo Districts indicate that Poa laxiflora can be found one season in a particular area, not flower the next year, and reappear in the subsequent year, causing some speculation that it may be biennial or flower intermittently. Plants were also excavated to determine the rate of asexual reproduction. Poa laxiflora was found to be weakly rhizomatous, with a very shallow rooting system (only 2-5 cm deep). Plants produce an average of 4-5 tillers, though the number of tillers may range from 2-10.

Seeds may be dispersed by water, mice, elk, deer, and mountain beaver. There seems to be a strong correlation between occurrence of Poa laxiflora and animal activity, especially elk and mountain beaver. Poa laxiflora is frequently found along game trails and around mountain beaver burrows. Elk reduce brush cover and disturb the soil surface, therefore creating openings which may allow Poa laxiflora to get established. Elk may disseminate seeds by their feet or digestive tracts. The foraging and burrowing activities of mountain beaver reduces the brush and herb cover, and disturbs the soil. Mountain beaver have small, often overlapping home ranges which average 0.12 hectare, and about 90% of the adults operate within 24 meters of their nests (Maser et al. 1981). Therefore, if they do disseminate Poa laxiflora seeds, it is probably localized.

III. Plant Survey Results and Status

A. Site Definition.

There has been considerable variation in how field surveyors define a Poa laxiflora site. This variation is due to several factors, including: 1) a field observer's interpretation of the boundaries which

define a Poa laxiflora population, 2) boundaries of project areas may artificially separate a population into several sites, and 3) changes in regional direction on how to fill out survey forms. USFS Region 6 TES plant survey forms and guidelines have become more standardized and detailed in recent years. These recent changes, as of 1990, incorporate opportunities for a field observer to record small, scattered clumps of plants as "subpopulations" of one larger population. Therefore, we may have one sighting report for several clumps of plants, whereas, prior to 1990, one sighting report may have been filled out for each individual clump of plants.

Though the above variation exists, in order to analyze Poa laxiflora data and determine a management strategy, **each sighting report is considered one site**, regardless of whether or not subpopulations have been reported. If a proposed project area (such as a timber sale unit or a stream reach segment for a fisheries enhancement project) is surveyed and no TES plants are found, a "negative sighting report" is completed that details general information about the project area. Negative sighting reports provide important information about patterns of distribution for TES plants. Knowing which areas do not contain TES plants may be as valuable as knowing which areas are important to maintaining species viability. In GIS, a negative site is shown as a polygon, representing an area searched with no TES plants located. A positive site, on the other hand, is shown as a point on the landscape.

B. Number of Sites.

Except for a few sighting reports filed in 1979 and 1980 on Hebo and Alsea Districts, extensive surveys for Poa laxiflora began on the Forest in 1986. Section VI (Management) of this Species Management Guide summarizes the history of Poa laxiflora sightings and management. Poa laxiflora has been found in approximately 16% of areas surveyed. Currently, the Forest has 213 Poa laxiflora sites, compared to 861 negative sites (Table 1). However, these numbers may change. Duplicate information and sighting reports with inadequate relocation directions will be dropped from the database as sites are entered into a Geographic Information System (GIS). Therefore, the number of Poa laxiflora sites on the Forest could decrease.

C. Distribution of Sites.

Distribution data is biased because: 1) surveys have primarily been conducted on proposed timber sale units, and 2) areas immediately surrounding timber sale units, such as stream buffers, and some areas affected by timber sales, such as access roads, have not been consistently included in surveys.

General Distribution across the Forest

On the Forest, Poa laxiflora occurs on four of five ranger districts: Alsea, Hebo, Mapleton, and Waldport. It is not known to occur on the Oregon Dunes National Recreation Area. The majority (68%) of

Table 1. Number of sites and percent occurrence of Poa laxiflora, Siuslaw National Forest, Oregon. A negative site represents an area surveyed which did not contain any threatened, endangered, or sensitive plant species.

District	No. of Positive Sites	No. of Negative Sites	Percent Occurrence on Forest
Hebo	76	229	35.7
Alsea	69	318	32.4
Waldport	43	247	20.2
Mapleton	25	293	11.7
TOTAL	213	1,087	100

Poa laxiflora sites on the Forest occur on Hebo and Alsea Districts (Table 1). Hebo contains 36% of the known sites; Alsea 32%. Waldport and Mapleton Districts have far fewer sites (20% and 12%, respectively).

Table 2 lists information about Poa laxiflora sites that occur on the edges of its geographic distribution within the Forest. Hebo District contains the most northern sites. Alsea District contains the most eastern sites, with two of these known to be stable and protected within the Mary's Peak Scenic Botanical Special Interest Area. The most western site is on Waldport District in the coastal Cummins Creek Wilderness Area. Other coastal sites occur on Hebo District, but their status is unknown. The most southern known site for the species occurs on the Forest's Mapleton District, along the North Fork of the Smith River. In 1971, a Poa laxiflora site was reported in southwest Oregon in Josephine County, in Oregon Caves National Monument (Baker 1971). However, this site has not been recently verified and Poa laxiflora is not thought to occur that far south.

The Randall Saddle area on Alsea District contains what may be the most important area for the continued viability of Poa laxiflora on the Forest. This area, located between Elk and Nettle Creeks, southwest of the town of Harlan, Oregon, contains the highest density of Poa laxiflora sites on the Forest and includes the largest known population on the Forest, estimated at 1,685 flowering culms, in the Flynn Creek Research Natural Area (RNA). Other substantially large Poa laxiflora populations occur in this area. Mapleton District contains the second largest known population on the Forest, estimated at 1,593 flowering culms, located along a lower slope in a canyon bottom in the Herman Peak area. Table 3 lists all known large populations (300+ flowering culms) of Poa laxiflora on the Forest.

The lowest elevation site (approx. 55 ft.) occurs on Waldport District. It is a small population with only 15 flowering culms, and occurs in a fish enhancement project along Canal Creek. The highest elevation site (3,780 ft.) occurs on Alsea District in the Mary's Peak Scenic Botanical Special Interest Area.

The Forest has digitized all known Poa laxiflora sites into a Geographic Information System (GIS). For Hebo and Alsea Districts, negative sites (= those areas surveyed in which TES plant species were not found) have also been entered into GIS. Negative sites on Mapleton and Waldport Districts have not yet been digitized into GIS.

Alsea District

Poa laxiflora has been found throughout the District, yet there is a tendency for larger populations to occur in the northern part of the district, in the Randall Saddle area (between Elk and Nettle Creeks, WSW of Harlan, Oregon) (Fig. 2).

Table 2. *Poa laxiflora* sites that occur along the edges of its distribution on the Siuslaw National Forest, Oregon. Geog. Dist. = General geographic location on the Forest. T,R,S, = Township, Range, and Section Number. TS = Timber Sale. # of culms = Number of flowering culms. DB# = Database reference number.

Geog. Dist.	District	T,R,S	Management	# of culms	Year	Habitat	Status	DB#
South	Mapleton	T19S,R9W,S7	Kentucky Falls SIA	49	1991	Riparian	Thought to be stable	1240
Most South	Mapleton	T19S,R10W,S25	Fish Habitat Project	10	1992	Riparian		1344
South	Mapleton	T17S,R10W,S33	Skywalker TS, Unit A	56+	1989	Riparian	Supposedly buffered 175-200 ft. from clearcut	659
Most North	Hebo	T3S,R9W,S3	Unknown	38	1988	Old skid trail	Not proposed for any management activity	111
North	Hebo	T3S,R9W,S4	Mature conifer area for marten	50	1988	Riparian and along roadbank	Status unknown; potential threat was road maintenance	112
Most Western	Waldport	T15S,R12W,S11	Cummins Creek Wilderness Area	10	1991	Riparian	Stable in short-term	1249
West	Hebo	T4S,R10W,S5	Miles Roundtop TS, Unit-20	10		Roadside	No impacts were anticipated	1134
West	Hebo	T4S,R10W,S8	Unknown	6	1979	Riparian	Unknown; status needs to be checked	321

Table 2. (Continued). *Poa laxiflora* sites that occur along the edges of its distribution on the Siuslaw National Forest, Oregon. Geog. Dist. = General geographic location on the Forest. T,R,S, = Township, Range, and Section Number. TS = Timber Sale. # of culms = Number of flowering culms. DB# = Database reference number.

Geog. Dist.	District	T,R,S	Management	# of culms	Year	Habitat	Status	DB#
Most Eastern	Alsea	T12S,R7W,S21	Mary's Peak SBSIA	48	1990	Along trail	Protected by management area designation	325
East	Alsea	T12S,R7W,S20	Mary's Peak SBSIA	522+	1990	Along trail	Same as above population	324
East	Alsea	T12S,R7W,S19	Chintimini Park TS, Unit-1	50	1989	Within riparian and headwall buffer area	Unknown	419

Table 3. *Poa laxiflora* populations with 300+ flowering culms, Siuslaw National Forest, Oregon. Pop = Number of flowering culms. TS = Timber Sale. Elev = Elevation in feet. DB# = Database Reference Number.

District	Pop	Year	Management Area	Location	Elev (ft.)	Landform	Status	DB#
Hebo	400+	1990	Stillwell Leave TS, Unit-K11	T5S,R9W,S33	500	Lower slope of broad ridge	Unit not included in preferred alternative	1
Hebo	480+	1990	Niagara 25 TS	T4S,R8W,S27	1580	Bench surrounded by ridge	Unit in HCA-3	11
Hebo	300+	1989	Foland Ridge TS, Unit-20A	T4S,R9W,S9	1300	Midslope	Monitoring plot established in 1989	57
Hebo	500+	1989	30 m. from Crazy Powder TS, Unit B	T4S,R8W,S28	2250	Upper slope, moist seep	Unknown	88
Hebo	433	1990	Farmer EFF TS, Unit L	T3S,R10W,S34		Midslope bench	Unit dropped for Spottet Owl	34
Hebo	416	1990	Farmer EFF, Unit S	T3S,R10W,S35	1080	Bench	Unit dropped for Spotted Owl	33
Alsea	1685	1991	Flynn Creek RNA	T12S,R10W,S11	950	Lower slope alder flat	Protected and stable	1238
Alsea	522+	1990	Mary's Peak	T12S,R7W,S20	3720	Upper slope	Protected	342
Alsea	363+	1990	Savage Creek Fish Project	T12S,R9W,S14	400	Riparian flood plain	Stable	336
Alsea	710	1990	Randall Salado TS, Unit 2	T12S,R9W,S16	950	Bench near upper slope	508 culms in 8 acres dropped from sale	403

Table 3. (Continued). Poa laxiflora populations with 300+ flowering culms, Siuslaw National Forest, Oregon. Pop = Number of flowering culms. TS = Timber Sale. Elev = Elevation in feet. DB# = Database Reference Number.

District	Pop	Year	Management Area	Location	Elev (ft.)	Landform	Status	DB#
Alsea	350+	1989	Telephone Cable	T13S,R9W,S33	1500	Ridgetop meadow	Unknown	421
Alsea	500+	1992	Grant Eagle TS, Units-E,L,K	T12S,R9W,S22	1300	Midslope bench	100 ft. buffer marked around population	1156
Alsea	766	1992	Gopher Heide Unit-C	T12S,R9W,S15	1380	Ridgeside	Project postponed	1154
Mapleton	1593	1992	Drew Donkey TS	T17S,R11W,S3	1000	Lower slope, canyon bottom		1345
Mapleton	788	1992	Drew Donkey KV Fish Project	T17S,R11W,S22	400	Floodplain		1346
Mapleton	559	1992	Upper Green Creek	T17S,R9W,S4	375	Floodplain		1351

Fig. 2. Distribution of Poa laxiflora on Alsea District, Siuslaw National Forest, Oregon.

Hebo District

Fig. 3 illustrates the distribution of Poa laxiflora sites on Hebo District. Populations occur scattered throughout the district, often along old roads or on old landings. It is not restricted to riparian areas, as in Mapleton District, but often occurs on moist benches below ridgetops. The Yoncalla/Burnt Ridge area has a "clump" of Poa laxiflora populations, but this clumping may be a function of more survey efforts in this area due to timber sale planning and a result of the area being thinned in the 1970's.

Mapleton District

All Poa laxiflora populations except one occur in riparian areas on Mapleton District. Populations are distributed fairly evenly across the north half of the district, with no unusually high concentrations of populations in any one area (Fig. 4). The second largest known Poa laxiflora population on the Forest, estimated at 1,593 flowering culms, occurs in the north half of the district. Surveys in the south half of the District have only revealed two populations: one in Kentucky Falls Special Interest Area and one along the North Fork of the Smith River. The population along the Smith River is the most southern known site for the species.

Waldport District

Poa laxiflora has been found throughout the district, with the majority of sites occurring in riparian areas (Fig. 5). The distribution appears fairly evenly spread across the district, with no unusually high density of sites in any one location. Waldport District contains all three wilderness areas on the Forest, and Poa laxiflora populations occur in each of these areas.

D. Status of Sites.

Populations have not been tracked, except for a few monitoring plots on Hebo District (see Monitoring Section). The Forest has 213 positive Poa laxiflora sites, yet an unknown number of these may be lost due to timber harvesting (primarily clearcutting) and site preparation methods (such as scarification and forage seeding). Therefore, the actual number of stable, protected populations is unknown.

In an attempt to determine the status of populations, an information request was mailed in spring, 1991, to the four districts that have Poa laxiflora populations (Alsea, Hebo, Mapleton, and Waldport). For each entry in the data table, the districts were asked to provide the following information: 1) what type of project was planned for the site?, 2) was the Poa laxiflora population to be protected through buffering? If so, how wide was the proposed buffer width?, 3) was the site revisited following project implementation to determine the actual on-the-ground buffer width?, and 4) which populations were scheduled for protection? If so, describe the type of protection (e.g., within

Fig. 3. Distribution of Poa laxiflora on Hebo District, Siuslaw National Forest, Oregon.

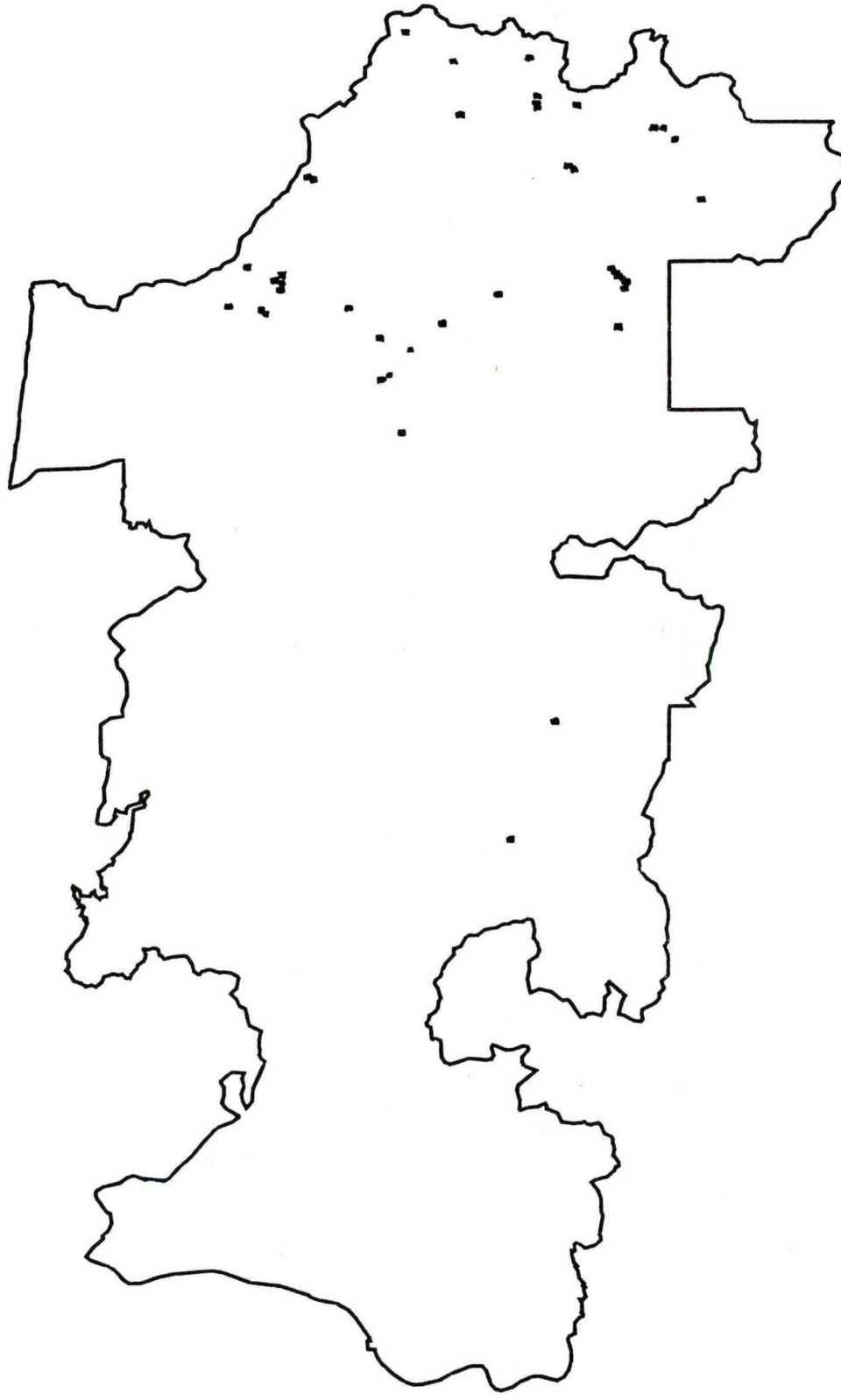

Fig. 4. Distribution of Poa laxiflora on Mapleton District, Siuslaw Naional Forest, Oregon.

Fig. 5. Distribution of Poa laxiflora on Waldport District, Siuslaw National Forest, Oregon.

Spotted Owl management areas, such as Habitat Conservation Areas, riparian zones, headwall buffer areas, mature conifer cover for marten, or special interest areas).

All districts but Waldport responded. Information was not available for each site; therefore, we still do not know the status of many populations. Several districts identified populations that were outside the unit boundary, yet we cannot conclude that these populations are stable and unaffected by the project activity. This depends on whether or not the project affected moisture and/or light conditions in the proximity of the population.

It is apparent, from this information request, that we do not know the status of many of our Poa laxiflora sites. The only way to verify status is to field check each site. However, due to the high number of sites and future budget reductions, the Forest will limit field verification efforts to those populations which meet the criteria for protection status (See Management of Selected Populations, Section C).

E. Summary of Monitoring Information.

Table 4 summarizes Poa laxiflora monitoring sites on the Forest. Past monitoring efforts have been poor due to a lack of resources (people, money, and time) and a central person to design and coordinate the effort. The final Conservation Strategy will include a monitoring plan and field monitoring will be coordinated by either the Forest Botanist or the District T&E Coordinator.

HEBO - Most of the Forest monitoring sites are on Hebo District. Hebo District has five sites with a total of seven actual plots (marked with orange carsonite stakes) and one observational (i.e., plotless) area. Three of these monitoring sites (located in Yoncalla Redo B and C thinning units and Slick Falls Timber Sale, Unit B) have been consistently sampled, whereas two monitoring sites (located in Austin Spruce Timber Sale, Unit A, and Foland Ridge Timber Sale, Unit 20A) have not been consistently sampled (Table 4). Control plots were not established with which to compare the data to determine if population trends are related to timber harvest methods or possibly to yearly weather patterns. However, the data suggest that light commercial thinning seems to have a positive effect on Poa laxiflora, whereas clearcutting, at least in Slick Falls Timber Sale, had a negative effect. Poa laxiflora is persisting in the Austin Spruce clearcut, however, the population has not been counted since 1989, and, therefore, it is unknown whether the population is increasing or decreasing. The fact that it is persisting may be due to its occurrence in a moist microsite within the unit. Apparently, a buffer of alder shrubs was left to protect this Poa laxiflora population, but the alders have since blown down.

Table 4. Summary of *Poa laxiflora* monitoring sites, Siuslaw National Forest, Oregon. Sites not visited are indicated by a hyphen. Sites were not monitored in 1992.

District	Project Name	Project Type	Site # (if any)	Number of Flowering Culms			
				1987	1989	1990	1991
Hebo	Yoncalla Redo B	Thinned (1988)	5	50+	35	-	201
Hebo	Yoncalla Redo B	Thinned (1988)	6	50	40	165	462
Hebo	Yoncalla Redo B	Thinned (1988)	7	30	100	45	180
Hebo	Yoncalla Redo C	Thinned (1988)	-	>50	30	-	83
Hebo	Slick Falls B	Clearcut (1989)	-	154	70-80	6	-
Hebo	Foland Ridge 20A	Scheduled to be clearcut (1993)	A	-	50-70	-	-
Hebo	Austin Spruce A	Clearcut (1987)	-	90	40	-	-
Waldport	Canal 503	Buffered from clearcut	-	-	-	110	-

WALDPORT - One monitoring plot was established on Waldport District in 1990 to monitor a population of Poa laxiflora in an area dropped from the Canal 503 Timber Sale (Table 4).

ALSEA - Alsea District established several monitoring plots in 1988 to gather information on the biology of Poa laxiflora and its responses to disturbance from timber harvest activities. The objectives were to evaluate the effects of the following situations on Poa laxiflora: 1) clear cut only, 2) clear cut and burned, 3) clear cut, burned and forage seeded, 4) areas adjacent to clear cut with increased light from logging disturbance, and 5) control areas with no disturbance. Plots were to be visited for 5 years, yet the plots were not visited in 1989 due to lack of personnel and funding. Attempts to relocate these plots in 1990 were unsuccessful due to such significant habitat alteration that the site relocation directions were no longer applicable.

MAPLETON - No monitoring plots have been established.

In summary, the problems with the current level of Forest monitoring are: 1) too few plots to determine effects of management activities, 2) a lack of control plots, 3) poor relocation directions or plot marking methods, 4) lack of resources (people and money), and 5) comparisons are based strictly on the number of flowering culms. The problem with counting the number of flowering culms is that the number may remain stable, while other important measures of population vigor and health, such as the number of seeds or flowers, may decrease or increase. The advantage of counting the number of flowering culms is that it is non-destructive.

The Alsea Resource Area of the Salem Bureau of Land Management has monitored Poa laxiflora (Exeter 1991). In 1986, 14 sites were established to monitor the effects of various mangement activities, such as clearcutting (populations directly effected by harvesting and populations buffered from clearcuts), thinning, and road building and maintenance. All monitoring has been observational; there are no established permanent plots. The results suggest that thinning and road maintenance (primarily brush removal) may be beneficial to Poa laxiflora. Though Poa laxiflora populations disappeared in many of the clearcuts, several populations have persisted in clearcuts. The data suggests that Poa laxiflora may survive clearcutting depending on: 1) if it occurs in a wet or very moist microsite; 2) slope position and aspect (lower slope and north aspect); 3) type of site preparation (it may survive a cool burn if the ground is not scarified and forage-seeded). As with the Siuslaw National Forest monitoring sites, BLM is also lacking control plots. Three of their observational monitoring sites were established in undisturbed areas (two in riparian zones and one along a road), but these sites have not been consistently revisited.

IV. Effects of Disturbance

Field observations and limited monitoring data indicate that some Forest management activities often have detrimental effects on Poa laxiflora.

As mentioned earlier, moisture and light are thought to be the most limiting factors influencing Poa laxiflora's distribution, with moisture especially important. Activities that significantly remove the canopy cover and alter the hydrology of an area will usually cause Poa laxiflora's demise. Also, secondary effects from management activities, such as windthrow following a clearcut, may impact Poa laxiflora populations that are narrowly buffered from the activity. Some of the most common management activities and their potential threats to Poa laxiflora are:

1. Clearcutting. Removes canopy cover and reduces moisture. Field observations indicate Poa laxiflora usually will not survive clearcutting.

2. Site Preparation Treatments. Clearcutting in combination with site preparation treatments, such as scarification, burning, and forage seeding will usually have a detrimental effect on Poa laxiflora. Siuslaw Forest Botanist visited several BLM clearcuts in July, 1991. Those sites that were scarified and burned had high cover of thistle (Cirsium sp.) in comparison to sites that were burned and not scarified. Heavy machinery used to scarify sites causes soil disturbance, which gives exotic species a competitive advantage over Poa laxiflora. Also, uncleaned machinery may disperse seeds and rhizomes of exotic species between project areas. Two Poa laxiflora populations were observed which survived clearcutting and slash burning. The populations were located either in a moist draw or at the bottom of a north-facing slope, in a moist seep. The areas had both received cool burns without much slash. Timing (spring vs. fall) and intensity (amount of slash) of burns, in conjunction with location of the plant's microsite, may make a difference regarding Poa laxiflora's survivability.

3. Forage Seeding. Poa laxiflora is a non-aggressive native plant that is easily outcompeted by many of the aggressive introduced plant species that are used in Forest forage-seeding projects. Sites that are clearcut, slash-burned, and forage-seeded will most likely eradicate any Poa laxiflora populations.

4. Road Building. The effect of road building on Poa laxiflora's survival is influenced by the amount of canopy cover removed, the type of road, and whether or not the entire Poa laxiflora population was destroyed in the process. Poa laxiflora may persist and even increase along old (10-15 yrs.) cat roads in which little canopy cover was removed.

5. Commercial Thinnings. Poa laxiflora survival depends on the level of canopy cover reduction and the amount of ground disturbance. Monitoring plots on Hebo District indicate that light commercial thinning is not detrimental to Poa laxiflora.

6. Fish Enhancement Projects. Many of the activities associated with fish enhancement projects are short-term disturbances which do not remove significant amounts of canopy cover. Some trees may be felled to use as stream structures, but not enough trees to drastically

reduce canopy cover. Tree felling and dragging activites can usually be designed to avoid direct physical impacts to Poa laxiflora populations.

Fish enhancement projects usually involve planting conifer species in the riparian zone in order to speed up succession. Brush-releasing activities around the conifers may impact Poa laxiflora in the short-term by physically trampling some individual plants, yet, may enhance Poa laxiflora habitat in the long-term by reducing cover of competitive brush species, such as salmonberry. The long-term effects on Poa laxiflora from conifer planting are unknown, and depend on the forest composition and structure.

7. Trail Maintenance. Trail maintenance may have minimal effects on Poa laxiflora populations, especially if maintenance is not conducted every year over the same population and if maintenance is limited to shrubs when working where there is a known population. Poa laxiflora is rhizomatous and probably would survive as long as the soil is not disturbed and the population is not buried under too much slash debris, and may even increase with less competition from shrubs, such as salmonberry. However, we do not know the role seed production and germination play in Poa laxiflora's long-term survivability (see Biological Characteristics Section). If seeds are critical to maintaining populations (vs. asexual reproduction by rhizomes), then it could be important to time trail maintenance to occur after fruits have matured and dehisced.

8. Buffers. Buffer widths are especially important for protecting Poa laxiflora populations from projects which drastically alter the environment, such as clearcutting. Buffer widths of 100 ft. are commonly used on the Forest. However, research indicates that buffer widths of 200-400 ft. are necessary for maintaining microclimatic conditions (Spies et al. 1990).

10. Conifer Plantations. Field observations suggest that regeneration of clearcut timber sale units by planting conifers negatively impacts Poa laxiflora. As the trees grow and the canopy closes (usually anywhere between 15-30 year old stands), very little light penetrates the forest floor and diversity of plant species is greatly reduced. Oregon sorrel (Oxalis oregana), false lily-of-the-valley (Maianthemum dilatatum), and swordfern (Polystichum munitum) may be the only species present. If Poa laxiflora is present, it will be limited to wet spots within or along the margins of the plantation, or along spur roads. As the canopy opens up, when the plantation reaches 25-40 years of age, any Poa laxiflora survivors (e.g. in the seed bank) may again be visible.

Poa laxiflora can withstand some small-scale disturbances (see Section on Biological Characteristics, Typical Habitats). Exeter (1989) began observational monitoring of Poa laxiflora populations in 1986 and compiled the following lists of forestry activities and their effects on Poa laxiflora:

A. Types of disturbance that could cause Poa laxiflora sites to be lost:

1. Areas that will become drier due to clearcutting/canopy removal, especially upper slopes and ridges.
2. Areas that receive a hot/complete burn, such as steep slopes and areas containing an abundance of slash.
3. Riparian areas that will receive a hot/complete burn due to steep slopes and build-up.
4. Areas where landings are created for logging.
5. Pulling a ditch, road grading, and culvert cleaning if entire Poa laxiflora population is lost.

B. Types of disturbance with little effect on Poa laxiflora

1. Buffered/protected areas from logging and burning.
2. Sites located on the perimeter of a timbersale where a hot/complete burn is not anticipated and complete canopy/shade removal does not occur (roadside and riparian areas that are timbered on the adjacent side of the clearcut).
3. Thinnings, road construction, skid trails providing canopy/shade removal is not complete and the entire populations in the area are not destroyed.
4. Roadside brushing
5. Pulling a ditch, road grading, culvert cleaning if entire population is not removed.
6. Moist meadow areas that will not receive a hot/complete burn.
7. Riparian areas that stay moist throughout the year & do not receive a hot/complete burn.

VI. Management

A. Historical Overview

1979 - Poa laxiflora was first documented on the Siuslaw National Forest in Tillamook County, on the Hebo Ranger District. Salem District BLM also began documenting the occurrence of this species on their lands in Lincoln County. Prior to 1979, only a few Oregon populations had been documented in the early 1900's in Clackamas, Polk, and Multnomah Counties.

1980 - Four additional populations were found on the Forest, and all were protected from disturbance. Between 1980 and 1986, there were no reported sitings of Poa laxiflora on the Forest. This could be due to a lack of knowledge about its habitat requirements and phenology, lack of surveys, inadequate survey methods, or misidentification of the species.

1986 - Five new sitings were reported on the Alsea District in proposed timber sale units. In order to determine what should be done about the plant sites, the Forest contacted other botanists and TES plant specialists at the Oregon Natural Heritage Data Base, BLM, and Forest Service Regional Office. Based on the little information known about the species (such as its habitat requirements, tolerance for disturbance, and reproductive

biology) and the location of the sites, it was agreed to remove the plants from disturbance by redesigning unit boundaries and dropping portions of harvest units.

1987 - Twenty-three additional populations were reported on Hebo, Alsea, and Mapleton Districts. Population sizes ranged from 4 to 254 flowering culms, and one population, recorded on Mapleton District, was beyond the known southern range of the species. Most of the 23 sites consisted of small, scattered "sub-populations". Nine of the 23 populations were completely protected from disturbance. The rest were partially or wholly disturbed, with monitoring planned for 11 sites.

Because of the impact on management acitivities in 1986, the Forest began taking a more active role in trying to determine how to manage or protect Poa laxiflora. Strategy meetings began in July, 1987 to develop a plan of action to deal with positive sightings of Poa laxiflora within timber sales. Botanists were consulted at Oregon State University and the Oregon Natural Heritage Data Base, who provided help with species identification and management recommendations. This resulted in the following interim action plan (until additional information was known about Poa laxiflora):

> For each new population of Poa laxiflora within timber sale units, confirm its identification and search the surrounding area to document the boundaries of the population. Work with the District Timber Sale Officer to determine the possibility of harvesting around the site without disturbing the population. Determine if the population could be protected with minimum impact to the timber sale (e.g. through slight modifications of the unit boundary). If protecting the population created a large impact to the timber sale, such as deficit volume costs due to dropping an entire unit, then only protect those sites with 100+ flowering culms. A site was defined as 1/2 acre. If the population was less than 100 flowering culms, consider not protecting the site and monitoring the effects of the disturbance on the population.

A monitoring strategy was developed to collect data on the disturbed sites. Monitoring was designed to be observational (versus a statistical experimental design which required replications), and to be conducted pre-disturbance and for five years following disturbance. At selected monitoring sites, within a 1 meter radius of the center of the population, the following information was to be collected: number of plants (actually the number of flowering culms), phenology, soil moisture conditions, evidences of disturbance (man-made or natural), and percent cover of associated species (including an estimate for overstory species). In addition, two permanent photo points were to be established. However, this strategy was only partially implemented. In 1987, six plots were established on the Hebo District in areas scheduled for either clearcutting or commercial thinning, but information on percent cover of

associated species and soil moisture conditions has not been consistently collected, nor have the sites been consistently monitored (see section on Summary of Monitoring Information).

1988 - In February, 1988, the Siuslaw National Forest organized and facilitated a meeting that was held at the Salem BLM office. The purpose of the meeting was to discuss the current status and future management of Poa laxiflora (and Poa marcida). The Forest's objective was to gather available information about Poa laxiflora and to determine if: 1) it could be delisted from the USFS Region 6 Sensitive Plant List due to the fact that it is more abundant than previously thought, and 2) there was enough information to write a management guide for the species. The meeting was attended by representatives from the Mt. Hood National Forest (who began reporting Poa laxiflora in 1987), The Nature Conservancy, Oregon Natural Heritage Data Base, Salem District BLM, the Siuslaw National Forest, and the USFS Region 6 TES Program Director. It included field botanists familiar with the plant through conducting surveys and monitoring, and/or managers responsible for maintaining the populations. The past two years of field surveys had increased knowledge about Poa laxiflora's habitat and distribution, yet little was still known about its reproductive biology and the affects of different types of disturbance on this species. The group decided there was not enough information about the species to warrant delisting or to adequately write a management guide. More information was needed about how this plant species is affected by ground disturbing activities, and what are the primary threats to population survival and expansion. In summary, the group agreed that additional survey work should be concentrated in the Cascades (since the Mt. Hood N.F. is just beginning to find it; it was previously not suspected to occur outside of the Coast Range), within areas already protected from ground disturbing activities such as Wilderness Areas, and also within "old" sale areas since plants seem to be highly associated with past disturbance. Also, additional monitoring was needed. Monitoring should be set up to cover the range of potential disturbances that could threaten the species, and should be carried out for 5 years on a particular site. Area ecologists and botanists should be involved in setting up the monitoring design. It was also suggested that land management agencies not only protect sites with large plant populations, but also those sites with fewer individuals that occur near the edge of the species known range. These smaller populations may be "seed" populations that will help expand the range of the species in the future. Sites protected should occur throughout the range of the plants so that the overall distribution of the species is not disrupted. Also, sighting reports should clearly "flag" areas slated for protection. Protection meant no ground disturbing activities would be allowed that would affect the immediate site, or any of the surrounding vegetative structure that is shading the site.

By the end of the 1988 field season, the Oregon Natural Heritage Data Base had 74 Poa laxiflora sighting reports on file, with 50

of these being on the Siuslaw National Forest. The management strategy devised in 1987 was still in effect: protect all sites with 100+ plants from disturbance, and when possible, protect all populations from disturbance, regardless of number of plants. This strategy resulted in protecting 17-19 of the 50 known sites.

In the summer of 1988, on Alsea District, a pilot study was begun to gather information on the biology of Poa laxiflora (see section on Population Biology) and monitoring plots were established to evaluate Poa laxiflora's reponse to various levels of disturbance related to timber harvesting.

1989 - Thirty-seven new sites were found on the Forest. Hebo District collected information at their six on-going monitoring sites, plus two new plots were established in an area scheduled for clearcutting in 1992.

In September 1989, the Forest had an in-house meeting to discuss the status of and management direction for Poa laxiflora. Throughout the past year, the Forest had been in contact with the three agencies responsible for TES plants in Oregon: the USFWS, the State of Oregon Department of Agriculture, and the Oregon Natural Heritage Data Base. In general, the agencies felt that concerns about the future status of Poa laxiflora might be alleviated (therefore facilitating future delisting of this species) if significant populations were located outside of timber sale harvest areas and if a Species Management Guide was developed. Meeting attendees discussed strategies for accomplishing these tasks. Also, monitoring was once again identified as the key to proper management for Poa laxiflora.

1990 - The Forest hired its first permanent full-time Forest Botanist in July, 1990. Since Poa laxiflora begins to senesce in late July, depending on weather and microsite conditions, the Forest Botanist had only one month to become familiar with the species and its habitat.

By the end of the 1990 field season, 39 new sites were reported. Attempts to relocate Alsea District monitoring plots, which had been established in 1988, were unsuccessful. The sites had been altered drastically by timber harvest activities, and plot markers were unidentifiable. However, seasonal botanists on the Hebo Distrct revisited three of their eight monitoring sites. One new monitoring site was established on Waldport District.

In November 1990, the Forest Botanist attended the biennial Oregon Rare Plant Conference in Eugene, Oregon. The purpose of the conference is to gather information from professional botanists about TES plants and to update the Oregon Natural Heritage Data Base (now called Oregon Natural Heritage Program) Sensitive Plant List. Botanists dealing with management of Poa laxiflora were divided about the status and listing of Poa laxiflora. Some botanists felt there were enough sites to warrant delisting the species. Others felt that Poa laxiflora is

"habitat threatened" due to timber harvesting, and still needs protection. It was concluded that Poa laxiflora would not be delisted until a management guide was completed and enough populations were known to be protected throughout its range.

1991 - To determine if populations of Poa laxiflora, as well as all other species on the Forest Sensitive Plant List, exist in reserve and protected areas (wilderness, special interest, and research natural areas), the Forest hired a botany crew to survey these areas. During the short field season (about mid-June to beginning of August), the crew was able to survey portions of the three Wilderness Areas (Cummins Creek, Drift Creek, and Rock Creek), plus Flynn Creek and Neskowin Crest Research Natural Areas, and Kentucky Falls Special Interest Area. These surveys resulted in extending the known southern range of the species on the Forest, plus finding the largest known population of Poa laxiflora ever found on National Forest or BLM lands (1,685 flowering culms in Flynn Creek RNA on Alsea District). This was the first organized effort to evaluate populations outside of project areas. Table 5 summarizes the results of these surveys.

In addition to surveys in special management areas, Alsea, Hebo, Mapleton and Waldport Districts hired seasonal biological technicians to conduct surveys in proposed project areas. A total of 48 new sites were located on the Forest.

To collect information for a Conservation Strategy and learn more about Poa laxiflora's response to disturbance, the Forest Botanist visited BLM and Siuslaw monitoring sites. In addition, the Forest Botanist conducted training workshops for TES plant identification and survey methods, and supervised the SO botany crew.

1992 - Seasonal biological technicians were again hired to conduct TES plant surveys on Alsea, Hebo, Mapleton, and Waldport Districts. A total of 37 new Poa laxiflora sites were located on the Forest.

The draft Conservation Strategy underwent peer review by botanists with the Oregon Natural Heritage Program, Oregon Department of Agriculture, and U.S. Fish & Wildlife Service, as well as other botanists who have experience with the species.

B. Management Objective

The objective of this conservation strategy is to provide a plan for management of Poa laxiflora which will ensure the species' survival through time, and prevent the need for its placement on the Federal list of endangered and threatened species.

To meet this objective, our goal is to protect and maintain populations of Poa laxiflora across the Siuslaw National Forest. To ensure the long-term survival of these populations, it is essential to protect Poa laxiflora's habitat. This management strategy is a short-term approach

Table 5. *Poa laxiflora* sites in Wilderness Areas (WA), Special Interest Areas (SIA), Scenic Botanical Special Interest Areas (SBSIA), and Research Natural Areas (RNA), Siuslaw National Forest, Oregon. Pop = Number of flowering culms. Year = Year first observed. DB# = Database Reference Number.

District	Pop	Area	Location	Year	Notes	DB#
Alsea	1685	Flynn Creek RNA	T12S,R10W,S11	1991	Stable; no apparent threats	1238
Alsea	330	Flynn Creek RNA	T12S,R10W,S12	1991	Increased hiking could be future threat to 15 culm subpopulation	1239
Alsea	522+	Mary's Peak SBSIA	T12S,R7W,S20	1990	Trailside	324
Alsea	48	Mary's Peak SBSIA	T12S,R7W,S21	1990	Trailside	325
Mapleton	49	Kentucky Falls SIA	T19S,R9W,S7	1991	Unstable soils may be potential threat if recreation use increases	1240
Waldport	31	Drift Creek WA	T13S,R10W,S9	1991	Trailside	1241
Waldport	228	Drift Creek WA	T13S,R10W,S8	1991	Salmonberry encroachment and trail maintenance are threats	1242
Waldport	11	Drift Creek WA	T13S,R10W,S4	1991	Foot traffic and trail maintenance are only threats	1243
Waldport	4	Drift Creek WA	T13S,R10W,S8	1991	Trail maintenance could be threat	1244
Waldport	69	Drift Creek WA	T13S,R10W,S3	1991	Foot traffic may be threat	1245
Waldport	21	Drift Creek WA	T13S,R10W,S5	1991	Appears stable	1246
Waldport	21	Drift Creek WA	T13S,R10W,S6	1991	Appears stable	1247
Waldport	370	Rock Creek WA	T16S,R11W,S15	1991	Stable, but within 1/8 mi. of private land	1248
Waldport	10	Cummins Creek WA	T15S,R12W,S11	1991	Riparian area	1249
Waldport	264	Cummins Creek WA	T15S,R11W,S17	1991	Riparian zone; appears healthy	1250

(protecting populations) until information gained from monitoring can be used to develop a long-term strategy (protecting habitat). Monitoring will focus on collecting ecological data, and this information should help us better understand Poa laxiflora's habitat requirements, such as what forest seral stages it occurs in. Observations indicate that Poa laxiflora is linked to early seral communities, in which case, no-action protection may be detrimental to its long-term survival. Monitoring populations for at least five years is an important component of the Poa laxiflora Conservation Strategy.

Sensitive plant survey forms provide some habitat information for each population, such as associated species, elevation, aspect, slope, microtopography, and general descriptions of habitat and landform. However, more detailed information, such as forest structure and landform microposition, is not available. Monitoring will provide this type of information and help us to develop a long-term strategy for maintaining Poa laxiflora habitat on the Forest. Eventually, after learning more about Poa laxiflora's habitat needs, Poa laxiflora Management Areas could be developed. In these areas, Poa laxiflora is the primary "use" with other uses encouraged when they benefit this species.

C. Information Used to Develop Strategy

Because we know extremely little about the population biology of this rhizomatous grass species, we are unable to predict with certainty the steps needed for maintaining "viable populations" of Poa laxiflora on the Forest. For example, we do not know: 1) the minimum number of individuals that constitutes a viable population, 2) how to define a population other than to count the number of flowering culms (which could represent from one to many individuals); and 3) patterns of genetic exchange between populations. Also, characteristics of the population, such as size, density and vigor, and habitat factors, such as vegetation competition or stage of succession, can influence the future success of populations.

We cannot put management for this species on hold until research provides the answers to these questions. Therefore, existing information was used to develop a management strategy that will attempt to meet our management objective. The strategy employed in this guide is to provide protection for selected populations of Poa laxiflora distributed throughout its known range within the Siuslaw National Forest. Two categories of selected populations have been established: No-Impact Populations and Buffered Populations. The two categories differ in the degree of protection afforded the populations. These differences are discussed in the following section (Management of Selected Populations).

The following information was considered when developing this management strategy:

1. The Oregon Coast Range is the center of distribution for this plant.

2. The number of known Poa laxiflora sites is high in comparison to most other species that are considered sensitive by federal, state, and private agencies.
3. Poa laxiflora can survive, and even increase its population size, with low levels of disturbance, as long as there is not total canopy cover removal nor severe loss of moisture.
4. Poa laxiflora's "sensitivity status" is considered low because of # 2 and 3 above.
5. Current habitat information suggest that moisture and light conditions limit the occurrence and survival of this species.
6. Poa laxiflora occurs in moist alder or mixed alder/coniferous forests in association with swordfern, salmonberry, and various forbs and grasses. These habitats are common throughout the Oregon Coast Range.

In summary, Poa laxiflora is not considered to be an extremely sensitive species in serious jeopardy of endangerment. However, the Oregon Coast Range is the center of its distribution and timber harvest activities, such as clearcutting, can be detrimental to this species. The Siuslaw National Forest needs to make sure that populations of Poa laxiflora are protected throughout its range within the Forest.

D. Management Strategy

1. Objectives Used to Develop Strategy

In developing the management strategy, professional botanists were consulted and other plant population protection strategies were reviewed. As a result, the following management strategy objectives were selected:

1. Protect the overall distribution of the species. We need to protect sites with large plant populations, as well as those sites that may have fewer individual plants, that occur near the edges of the plant's known range. These smaller populations may be "seed" populations that will help extend the range of the species in the future.
2. Areas which have a high density of sites need to be protected.
3. Protect parcels of habitat to reduce chances of losing populations and to ensure microclimatic conditions are maintained.

2. Levels of Protection for Populations

This managment strategy ensures short-term protection and sets the stage for a long-term strategy based on information gained from monitoring. Monitoring populations for at least five years is an important component of the Poa laxiflora Conservation Strategy.

The strategy specifies a minimum number of populations to be selected for two different levels of protection:

1. No-Impact Populations

These are populations that appear to be healthy and stable, and occur within contiguous habitat that are completely protected from

project activities. The contiguous habitat must be large enough so that the plant population can move around as it naturally would (often referred to as "small scale population migrations"). This approach is based on protection of parcels of habitat that contain populations rather than identifying populations and establishing a buffer zone. This category must include populations of Poa laxiflora at all known geographic extremes of its range across the Forest. Using the criteria below, a minimum of 11 No-Impact Populations will be selected, with an attempt to protect populations in each geographic zone: north, northeast, east, southeast, south, southwest, west, northwest, north-central, mid-central, and south-central locations of the known range of the species.

a. Criteria used to identify No-Impact Populations:

1. Size of contiguous habitat.

Twenty acres is the recommended minimum size of contiguous habitat for No-Impact Populations. Using sighting reports, the minimum size of twenty acres was chosen because it represents the amount of area occupied by the largest known population of Poa laxiflora on the Forest. This population numbers 1,685 flowering culms and occurs on 20-30 acres in the Flynn Creek Research Natural Area on the Alsea Ranger District. Other significant populations also occur on the Alsea Ranger District in the Mary's Peak Scenic Botanical Special Interest Area (522+ flowering culms) and along the ridge system of the Randall Saddle area (508 flowering culms). These two populations covered approximately 240 square feet and 350 square feet, respectively. There is a dramatic difference in area covered between 20-30 acres and 350 square feet. However, the most conservative approach that best benefits Poa laxiflora, is to use the larger area as a criteria for minimum required size of no-impact populations.

2. Populations that occur in pre-existing Special Management Areas.

Choosing populations that occur in areas already set aside and managed for other resources is an effective way to protect Poa laxiflora, and take advantage of areas that already have established boundaries and management guidelines. The following priorities for choosing populations is based on the future stability of the particular management designation.

a. 1st priority: Populations in Wilderness, Special Interest, and Research Natural Areas (Table 5).
b. 2nd priority: Populations in Spotted Owl Habitat Conservation Areas, Type 1.
c. 3rd priority: Populations in Spotted Owl Habitat Conservation Areas, Type 3.

3. Size of Population.

Though the majority of populations occur as small, scattered clusters of less than 30 plants each, larger-sized populations will have a greater chance of surviving any impacts to the population that could occur (such as natural catastrophe, elk browsing, fire, etc.).

a. 1st priority: Populations with > 100 flowering culms.

b. 2nd priority: Populations with 50-100 flowering culms.
c. 3rd priority: Populations with < 50 flowering culms.

4. Geographic distribution across the Forest.
As discussed above, the category of No-Impact Populations must include representative populations across all known geographic extremes of Poa laxiflora's range. These were identified as: north, northeast, east, southeast, south, southwest, west, northwest, north-central, mid-central, and south-central. Populations will also be evaluated for their geographic proximity to other populations (i.e., genetic exchange will be considered).

On Mapleton District, the Siuslaw River will be used as a management strategy boundary. All Poa laxiflora populations south of the river (currently there are two populations) will be protected as No-Impact populations. This strategy will protect the most southern known populations of this species.

5. Populations within high density areas.
Protect populations in areas which contain a rather high density of Poa laxiflora sites. These areas are assumed to be valuable in maintaining the viability of the species. Currently, the area which contains the highest density of Poa laxiflora sites is the Randall Saddle area on Alsea District.

6. Most recently found populations. This can save time and money in having to return to historic sites in order to verify the status of a population.

7. Populations that seem to be the most stable, vigorous and healthy.

8. Populations for which sighting reports contain adequate relocation directions.

b. Summary of Populations

Table 6 lists candidate No-Impact Populations. During spring, FY93, the Forest Botanist and District TES Coordinators will evaluate criteria and finish selecting No-Impact Populations. These populations will be visited during the FY93 field season to verify their status and evaluate their eligibility for this level of protection. The final list of No-Impact Populations will be included in a summary report due to be completed in March, 1994 (see section VI. Action Plan).

c. Future Direction

The goal of the Conservation Strategy is to choose 11 Poa laxiflora populations on the Forest that best meet the criteria for this level of protection. However, if future sensitive plant surveys reveal populations that are especially good candidates for No-Impact protection status, then these populations can be substituted in place of populations listed in the fall FY93

Table 6. Examples of potential No-Impact *Poa laxiflora* populations, Siuslaw National Forest, Oregon. Geog Dist = General geographic location on the Forest. Pop = Number of flowering culms. Year = Year population was first observed. Elev = Elevation in feet. DB# = Database Reference Number. Under Management Area, SBSIA = Scenic Botanical Special Interest Area; RNA = Research Natural Area; SIA = Special Interest Area; WA = Wilderness Area; TS = Timber Sale.

District	Area	Geog Dist	Pop	Year	Elev (ft)	Habitat	Notes	DB#
Alsea	Mary's Peak SBSIA	East	522+	1990	3660	Noble/grand fir stand	Stable; Foot traffic & trail maintenance are portential threats	324
Alsea	Flynn Creek RNA	Mid-central	1685	1991	950	Grassy alder flat	Stable; good control site for monitoring	1238
Mapleton	Upper Green Creek Fish Project	Southeast	559	1992	375	Riparian		1351
Mapleton	Kentucky Falls SIA	South	49	1991	800	Riparian	Population appears healthy, but on unstable soils.	1240
Waldport	Rock Creek WA	Southwest	370	1991	660	Alder/maple forest	Stable	1248
Waldport	Cummins Creek WA	West	264	1991	415	Riparian	Plants in high water zone	1250
Hebo	Niagara 25 TS, Unit-L1	North	480	1990	1580	Bench below ridge	Spotted Owl HCA-3	11
Hebo	Farmer EFF TS, Unit S	Northeast	300	1990	1080	Bench	Unit dropped	34

summary report. If the Forest cannot currently identify 11 populations that meet the criteria for No-Impact protection, then the FY93 summary report will explain the cells that still need to be filled.

2. Buffered Populations.

These are populations that are buffered from the disturbances of project activities. However, due to limited knowledge about what constitutes an effective buffer width that will maintain the integrity of microsite physical characteristics, these populations are less secure than the No-Impact Populations. This category protects sites by avoiding direct conflicts with project activities, yet does not preserve as much habitat as No-Impact Populations. It represents a compromise between protection and allowing project activities to proceed. Since population expansion is limited by buffer size, potential growth would be minimal. Research indicates that forest buffer widths need to be 200-400 ft., in order to maintain the integrity of the microclimatic environment (Spies et al. 1990).

a. Criteria for choosing Buffered Populations:

1. Geographic distribution across the District.

As discussed above for No-Impact Populations, this strategy aims to protect representative populations across the known geographic extremes of the plant species. Each district is roughly divided into the following 11 zones: north, northeast, east, southeast, south, southwest, west, northwest, north-central, mid-central, and south-central. Within each of these 11 zones, populations are chosen that will be buffered from management activities. Because Hebo and Alsea Districts contain 68% of all known Poa laxiflora sites on the Forest, they will have more Buffered Populations than Mapleton or Waldport Districts. Hebo and Alsea Districts will each have a total of 22 Buffered Populations (2 within each of the 11 geographic zones). Mapleton and Waldport will have 11 Buffered Populations (1 within each of the 11 geographic zones). Mapleton District's 11 Buffered Populations will be selected from known populations occurring north of the Siuslaw River (all populations south of the River will be protected as No-Impact Populations).

2. Adequate buffer from project activities.

a. 1st priority: Populations that have a 200-400 ft. buffer from project activities.

b. 2nd priority: Populations that have at least a 100 ft. buffer from project activities, as long as the buffer seems to provide adequate protection. Field visits to these sites will be necessary to evaluate this.

3. Genetically important populations.

A higher priority should be given to selecting those populations that occur in areas that may serve as a natural corridor between populations. These may provide a genetic link between populations. Important factor to consider is location (e.g., if

in a riparian corridor and is upstream from other known populations).

4. Size of Population.
As discussed under No-Impact Populations, Poa laxiflora usually occurs as small, scattered clusters of less than 30 plants each, larger-sized populations will have a greater chance of surviving any impacts to the population that could occur (such as natural catastrophe, elk browsing, fire, etc.).

a. 1st priority: > 100 flowering culms
b. 2nd priority: 50-100 flowering culms.
c. 3rd priority: If < 50 flowering culms, choose population that is geographically close to other known protected populations, and can possibly provide an extra gene source.
d. 4th priority: < 50 flowering culms and isolated from other populations.

5. Most recently sited populations. This can save time and money in having to return to historic sites in order to verify the status of a population.

6. Populations that seem to be the most stable, vigorous and healthy.

7. Populations for which sighting reports contain adequate relocation directions.

b. Summary of Populations

Tables 7 and 8 list candidate Buffered Populations for Alsea and Hebo Districts, respectively. During spring, FY93, the Forest Botanist and District TES Coordinators will evaluate criteria and finish selecting Buffered Populations for Alsea, Hebo, Mapleton, and Waldport Districts. If necessary, selected populations will be visited during the FY93 field season to verify their status and evaluate, on the ground, their eligibility for this level of protection. The final list of Buffered Populations will be included in a summary report due to be completed in March, 1993 (see section VI. Action Plan).

c. Future Direction

The goal of the Conservation Strategy is to make sure that Buffered Poa laxiflora populations on the Forest are those that best meet the criteria for this level of protection. If future sensitive plant surveys reveal populations that are especially good candidates for Buffered protection status, then these populations can be substituted in place of populations listed in the fall FY93 summary report. If the Forest cannot currently identify enough populations that meet the criteria for Buffered protection, then the FY93 summary report will explain the cells that still need to be filled.

Table 7. Examples of potential *Poa laxiflora* Buffered Populations, Alsea District, Siuslaw National Forest, Oregon. Geog Dist = General geographic location on the District. Pop = Number of flowering culms. Year = Year population was first observed. Elev = Elevation in feet. DB# = Database Reference Number.

Area	Location	Geog Dist	Pop	Year	Elev (ft)	Habitat	Notes	DB#
Savage Creek Fish Project	T12S,R9W,S14	North	366+	1990	400	Alder/Conifer Forest; Riparian	Revisited 1991 following project implementation; population healthy	336
Randall Salado TS, Unit 2	T12S,R9W,S16	North	508	1990	950	Grassy 80-year old alder meadow on bench	508/710 culms protected by deletion of 8 acres from TS	403
Grant Eagle TS, Units-E,L,K	T12S,R9W,S22	North	678+	1992	1300	Alder/Conifer Forest on midslope bench	One subpopulation of 173 was buffered out of unit; buffer width unknown; 100 ft. buffer flagged around subpopulation of 500 culms. Need to visit & determine if buffer widths are appropriate	1156
Pioneer Phone Cable	T13S,R9W,S33	East	350+	1989	1500	Meadow opening	Expected minimal impacts from project activity	421
Green River Fish Project	T15S,R10W,S24	Southwest	175	1992	200	Riparian alder forest	Project not expected to impact population	1321
Bucktooth, Unit 3, thinning	T15S,R10W,S11	Southwest	171+	1991	440	Riparian alder forest	Population outside of unit boundary, to NE	1149
Bucktooth, Unit 6, thinning	T15S,R9W,S18	Southwest	316	1991	240	Alder forest	Population on unit boundary; no anticipated project impacts	1150

Table 7. (Continued). Examples of potential Poa laxiflora Buffered Populations, Alsea District, Siuslaw National Forest, Oregon. Geog Dist = General geographic location on the District. Pop = Number of flowering culms. Year = Year population was first observed. Elev = Elevation in feet. DB# = Database Reference Number.

Area	Location	Geog Dist	Pop	Year	Elev (ft)	Habitat	Notes	DB#
Gopher Heide TS, Unit C	T12S,R9W,S15	Northwest	300	1991	1400	Ridgeside Alder/conifer forest	Protection was recommended for subpopulations E & F (300 of 627 culms) near unit boundary	1154
Gopher Heide TS, Unit G	T12S,R9W,S17	Northwest	250	1991	1150	Ridgetop alder/conifer forest	Population recommended for protection	1155
Gopher Homestead TS, Unit 1	T12S,R9W,S7	North-central	157	1990	600	Alder/conifer forest in draw & on slope	Status unknown	400
Randall Salado TS, Unit 5	T12S,R9W,S9	North-central	100	1989		Alder/conifer forest on bench below ridge	Status unknown	410
Lobster Claw TS, Unit F	T14S,R9W,S28	South-central	160	1989	600	Alder, big-leaf maple & Douglas-fir forest on bench at toe of slope	Site revisited in 1992; populations appeared unimpacted by timber sale	429
Lower Louie TS, Unit 2	T14S,R9W,S20	South-central	300	1991	800	Open meadow between plantation & conifer forest. Associated with bracken fern	TS access road was to be redirected. Status unknown	357

Table 8. Examples of potential *Poa laxiflora* Buffered Populations, Hebo District, Siuslaw National Forest, Oregon. Geog Dist = General geographic location on the District. Pop = Number of flowering culms. Year = Year population was first observed. Elev = Elevation in feet. DB# = Database Reference Number.

Area	Location	Geog Dist	Pop	Year	Elev (ft)	Habitat	Notes	DB#
Cedar Hebo TS, Units 37,39	T4S,R9W,S16	North-central	185+	1992	1500	Moist-wet meadows; midslope	Between 2 timber sale units	1378
Wildcat West Thin, Unit 2	T3S,R9W,S9	North	100+	1992	1400	Ecotone between grassy roadside & alder/conifer forest; midslope bench	Population along road; should be easy to buffer	1379
Side Road 1134	T4S,R10W,S15	Northwest	100+	1989	1050	Conifer forest	Population should be stable	98
Cedar Hebo TS, Unit 28	T4S,R9W,S17	North-central	150+	1992	1350	Midslope conifer forest; trailside	Along Plantation Trail; outside TS Unit boundary	1376
Yoncalla Redo B, Thin	T4S,R8W,S20	East	125	1987	2300	Alder/Douglas-fir forest; midslope bench	Monitoring site, plots 5 & 6; Total population (both plots) went from 100 culms (1987) to 662 culms (1991)	147
Stillwell Leave TS, Unit K-11	T5S,R9W,S33	South-central	195+	1990	520	Alder/conifer forest on lower, gentle slopes of broad ridge	Unit is not in Preferred Alternative; part of population is on private land	1
Stillwell Leave TS, Unit R	T5S,R9W,S32	South	171	1990	880	Mature alder/conifer forest on lower slope in floodplain	Unit is not in Preferred Alternative	13

3. Non-Selected Populations

The following protocal will be used for all remaining Poa laxiflora populations that are not selected as No-Impact or Buffered Populations:

1. Try to protect the population by working around it.

2. If protecting the population requires major alterations to a proposed project activity, allow the activity to proceed. However, a minimum of three populations per type of project activity must be selected across the Forest for monitoring so the Forest can view the effects of a management activity on these populations.

D. Monitoring

Monitoring provides information on the progress and results of implementing the Conservation Strategy, and helps us evaluate if we are achieving our objectives and goals. Monitoring is essential to ensuring that this Conservation Strategy is effectively meeting its objectives.

A monitoring plan will be completed by June, 1993, and implemented in June and July, 1993. Monitoring will be conducted for five years. The Forest will consult with various experts in order to develop an effective, efficient monitoring strategy that will provide useful information. These experts include Forest statisticians and ecologists, and, through a Challenge Cost Share Project, one of The Nature Conservancy's monitoring experts. This plan will include detailed information such as: 1) number, location, and size of permanent plots, 2) method for permanently marking plots, 3) data to be collected, and 4) monitoring forms.

Monitoring Objectives

Monitoring objectives are to assess the Conservation Strategy's effectiveness in protecting the viability of Poa laxiflora on the Forest and to learn more about its ecology. To achieve these objectives, the goals of the monitoring plan are: 1) to verify the status of the populations that were selected for protection, and provide knowledge of whether the populations are increasing, decreasing, or maintaining; and 2) to collect more detailed habitat information.

Monitoring of No-Impact Populations will be important in learning more about the ecology of Poa laxiflora. The No-Impact Populations will serve as control populations with which to compare populations that are affected by project activities.

VI. Action Plan

Table 9 lists actions, target completion dates, and coordinators for implementing this Conservation Strategy. The effectiveness of the

Table 9. Action plan for implementing the Poa laxiflora Conservation Strategy.

Action	Target Completion Date	Coordinators
Year 1 (FY93)		
Complete Forest & Regional Office Review	February 1, 1993	Forest Botanist; Forest Biologist
Complete signed Conservation Strategy	April 1, 1993	Forest Botanist
Finish digitizing sites into GIS	Completed	Forest Botanist; GIS Coordinator
Select preliminary No-Impact and Buffered Populations	May 1, 1993	Forest Botanist; District TES Coordinators
Develop Monitoring Plan	June 10, 1993	Forest Botanist; Ecologist
Field visits to determine status of preliminary populations	June-July, 1993	Forest Botanist; District TES Coordinators
Establish monitoring plots	June-July, 1993	Forest Botanist; District TES Coordinators
Year 2 (FY94)		
Complete any necessary revisions to Conservation Strategy (include tables showing No-Impact & Buffered Populations)	December 1, 1993	Forest Botanist
Enter monitoring data into database	February 15, 1994	Forest Botanist
Complete FY93 Summary Report	March 15, 1994	Forest Botanist
Field visits (if needed) to determine status of populations	June-July, 1994	Forest Botanist
Sample monitoring plots	June-July, 1994	Forest Botanist; District TES Coordinators
Year 3 (FY95)		
Enter monitoring data into database	October 1, 1994	Forest Botanist; District TES Coordinators
Analyze FY93 and FY94 data	December 15, 1994	Forest Botanist

Table 9. (Continued). Action plan for implementing the Poa laxiflora Conservation Strategy.

Action	Target Completion Date	Coordinators
Year 3 (FY95) (Continued)		
Complete FY94 Summary Report	March 15, 1995	Forest Botanist
Sample monitoring plots	July 31, 1995	Forest Botanist; District TES Coordinators
Year 4 (FY96)		
Enter monitoring data into database	October 1, 1994	Forest Botanist; District TES Coordinators
Analyze three years monitoring data	December 15, 1995	Forest Botanist
Complete FY95 Summary Report	March 15, 1996	Forest Botanist
Sample monitoring plots	July 31, 1996	Forest Botanist; District TES Coordinators
Year 5 (FY97)		
Enter monitoring data into database	October 1, 1996	Forest Botanist; District TES Coordinators
Analyze monitoring data	December 15, 1996	Forest Botanist
Evaluate effectiveness of Conservation Strategy	February 15, 1997	Forest Botanist
Complete 5-year Summary Report	February 15, 1997	Forest Botanist
If necessary, amend Conservation Strategy	April 1, 1997	Forest Botanist

Conservation Strategy will be evaluated annually and yearly status reports will be prepared. After 5 years of monitoring, the Strategy will be assessed for its effectiveness. Protection measures may need to be changed.

XI. References

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APPENDIX 1. Species associated with Poa laxiflora.

Forbs

Achlys triphylla
Asarum caudatum
Athyrium felix-femina
Boykinia elata
Circaea alpina
Delphinium sp.
Dicentra formosa
Disporum hookeri
Digitalis purpurea
Disporum smithii
Dryopteris austriaca
Epilobium glandulosum ssp. tenue
Equisetum telmateia
Galium aparine
Galium asperrimum
Galium triflorum
Heracleum lanatum
Hieracium albiflorum
Hydrophyllum tenuipes
Maianthemum dilatatum
Marah oregana
Mimulus dentatus
Mitella caulescens
Montia parvifolia
Montia sibirica
Nemophila sp.
Oenanthe sarmentosa
Osmorhiza chilensis
Oxalis oregana
Oxalis trillifolia
Prunella vulgaris
Pyrola uniflora
Ranunculus uncinatus
Rumex acetosella
Scrophularia californica
Senecio jacobaea
Senecio sylvaticus
Senecio vulgaris
Stachys cooleyae
Stachys mexicana
Stellaria calycantha
Stellaria crispa
Stellaria media
Streptopus roseus
Tiarella trifoliata
Tolmiea menziesii
Trientalis latifolia
Trillium ovatum

Viola glabella
Viola sempervirens

Grasses

Agrostis sp.
Anthoxanthum odoratum
Bromus carinatus
Bromus vulgaris
Calamagrostis canadensis
Elymus glaucus
Festuca subulata
Festuca subuliflora
Glyceria elata
Holcus lanatus
Melica subulata
Pleuropogon refractus
Poa trivialis
Trisetum canescens

Sedges/Rushes

Carex deweyana
Carex hendersonii
Luzula campestris
Luzula parviflora

Ferns

Adiantum pedatum
Athyrium felix-femina
Blechnum spicant
Polystichum munitum
Pteridium aquilinum

Shrubs - Some tree sp. recorded as small shrubs in understory

Acer circinatum
Alnus rubra
Gaultheria shallon
Menziesii ferruginea
Oplopanax horridum
Rhamnus purshiana
Rosa gymnocarpa
Rubus parviflora
Rubus spectabilis
Rubus ursinus
Sambucus callicarpa
Sambucus racemosa
Vaccinium parvifolium

Trees

Abies grandis
Abies procera
Acer macrophyllum
Alnus rubra
Picea sitchensis
Pseudotsuga menziesii
Thuja plicata
Tsuga heterophylla

APPENDIX 2. Percent occurrence of plant species in 123 Poa laxiflora subpopulation microsites, Alsea District, Siuslaw National Forest, Oregon.

Species	Number of Microsites	Percent Occurrence
Trees		
Alnus rubra	100	81
Pseudotsuga menziesii	28	23
Acer macrophyllum	16	13
Tsuga heterophylla	4	3
Abies procera	4	3
Abies grandis	3	2
Thuja plicata	1	1
Shrubs		
Rubus spectabilis	84	68
Polystichum munitum	82	67
Acer circinatum	44	36
Sambucus racemosa	37	30
Vaccinium parvifolium	22	18
Ribes bracteosum	18	15
Rubus ursinus	14	11
Gaultheria shallon	13	11
Corylus cornuta	10	8
Rhamnus purshiana	5	4
Rubus parviflorus	5	4
Rosa gymnocarpa	4	3
Osmaronia cerasiformis	4	4
Salix ssp.	3	2
Berberis nervosa	2	2
Oplopanax horridum	2	2
Vaccinium ovatum	2	2
Holodiscus discolor	2	2
Ribes lacustre	1	1
Herbs, Grasses & Sedges		
Bromus spp.	72	59
Montia sibirica	72	59
Stachys mexicana	71	58
Galium triflorum	64	52
Oxalis oregana	60	49
Tolmiea menziesii	52	42
Mimulus dentatus	50	41
Dicentra formosa	43	35
Digitalis purpurea	42	34
Athyrium felix-femina	40	33

Luzula parviflora	38	31
Viola glabella	36	29
Pteridium aquilinum	31	25
Poa trivialis	28	23
Melica subulata	27	22
Stellaria crispa	25	20
Carex deweyana	24	20
Trisetum cernuum	23	19
Urtica dioica	21	17
Agrostis spp.	20	16
Festuca subulata	19	15
Holcus lanatus	17	14
Disporum smithii	16	13
Carex spp.	16	13
Carex hendersonii	16	13
Ranunculus uncinatus	12	10
Oenanthe sarmentosa	12	10
Elymus glaucus	12	10
Maianthemum dilatatum	11	9
Blechnum spicant	11	9
Galium aparine	10	8
Glyceria elata	10	8
Adenocaulon bicolor	9	7
Festuca subuliflora	9	7
Marah oreganus	9	7
Osmorhiza chilensis	8	7
Hydrophyllum tenuipes	8	7
Equisetum telmateia	8	7
Oxalis trilliifolia	8	7
Circaea alpina	7	6
Mitella caulescens	7	6
Campanula scouleri	6	5
Carex brewerii	6	5
Cirsium spp.	6	5
Vancouveria hexandra	5	4
Luzula campestris	5	4
Viola sempervirens	5	4
Nemophila parviflora	5	4
Senecio jacobaea	5	4
Mimulus guttatus	4	3
Montia parvifolia	4	3
Adiatum pedatum	3	2
Erechtities minima	3	2
Smilacina stellata	3	2
Senecio spp.	3	2
Carex sitchensis	3	2
Dryopteris expansa	3	2
Lysichitum americanum	3	2
Ranunculus repens	3	2
Tellima grandiflora	3	2
Petasites frigidus	3	2
Prunella spp.	2	2
Achlys triphylla	2	2
Stellaria calycantha	2	2